Proceedings of the Iowa Academy of Science

Volume 13 | Annual Issue Article 10

1906

Floristic Notes from an Illinois Esker

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FLORISTIC NOTES FROM AN ILLINOIS ESKER.

BY BRUCE FINK.

Plates IV-VI.

Kaneville is a village in Kane county, Illinois, and is situated about fourteen miles from Aurora, Illinois, west by a few degrees north. At Kaneville, the present writer passed several years of his boyhood and early youth, and here it was that he took his first lessons in natural science, learning the names and habits of a considerable number of birds and plants and gaining some inklings of the interesting mysteries of geological science.

Northeast of Kaneville, some seven miles, is located the conspicuous elevation, standing some 80 feet above the surrounding country, covering about 100 acres, and known as Bald Mound. About two miles from Bald Mound, in the direction of Elburn, lies the similar but wooded swell of land known as Johnson's Mound. Passing two or three miles southeast of Kaneville, on the Aurora road, one finds at the right of the road a rounded hill, near the yard formerly known as the "Billy Benton" place, but now owned by Clarence Humiston. This hill rises to an elevation of about 40 feet above the surrounding prairie and is a conspicuous landmark. Passing in the direction of Aurora, one soon notices on the opposite side of the road a long gravel hill, of similar elevation, at first a mile wide and tumultuously irregular, but soon becoming regular and narrow, with a rounded top only two or three rods across and sloping downward at an angle of about thirty degrees with the horizon.

These gravel hills and many other similar ones in this portion of Illinois were among the unsolved mysteries of youthful days, and the summer of 1905 gave the writer the first opportunity, since having had some experience in interpreting topographic features and observing the accompanying plant life, of studying the familiar till knolls and the esker with their flora.

The rounded hill at the Humiston place, and the long hill into which it is continued are a portion of the "Kaneville Esker",—the bed of an extinct subglacial stream. This esker has been traced from a point three or four miles northwest of Aurora, to the rounded hill noted above and is about eight miles long. Toward Aurora erosion has planed the esker down until at present it consists of a series of knolls and short ridges, but further northwestward one finds toward the Kanesville-ward end of the esker a continuous ridge, from 20 to 60 feet high, with only occasional gaps, and slopes frequently as high as 30 degrees. Still northwestward from the esker proper, which terminates at the rounded hill, lies the delta of the old subglacial river, covering an area of about eight square miles, surrounding the village of

Kaneville, and rising a few feet above the till plain of the region. Well borings in the delta region have shown a deposit of gravel and sand 30 or 40 feet deep, but most of the area is covered with humus, giving mesophytic conditions and making excellent farm-land, with here and there a surface exposure of gravel, bringing xerophytic conditions and easily available gravel and sand, the largest of these being on the Spenser farm, about a mile from Kaneville.

Bald Mound and Johnson's Mound are but two high elevations of the undulating till sheet left by the glacier (Wisconsin till sheet) and extending at least from Plano, in Kendall county, northward through Sugar Grove and Blackberry townships in Kane county. The esker crosses this area of till knolls in Sugar Grove township, and the general topography of the till area is not greatly different from that of the more tumultuous portion of the esker, so that the casual observer would find it difficult to distinguish between this portion of the esker and the general till-topography.

The esker and the till knolls are quite similar as to nature of deposit, all containing gravel, with beds of sand and clay interspersed, and all form the main deposit, running and percolating water carrying the finer portions down to a lower level. As the writer traveled over portions of this area last summer, he was impressed with the former possibility of an excellent ecologic study, but pasturing, deforestation, and cultivation have now gone on to such an extent as to leave only a few spots in their original condition, while the gravel is of great value for commercial purposes, and the esker was being removed rapidly while we were studying its flora. The accompanying map shows the position of the esker, the esker valley and the distribution of the till knolls in the surrounding region. To explain further the origin of the till and the esker is too far removed from the present purpose, but those interested are referred to a paper by Frank Leverett, "The Illinois Glacial Lobe", in Monograph 38 of the United States Geological Survey.

Dr. H. C. Cowles, of Chicago University, was with the writer during the first day's study of the flora, and aided considerably in the study of the spermaphytes. The elevation and the gravelly and calcareous nature of the knolls and the esker were found to have resulted in certain floristic peculiarities, purely xerophytic so far as the seed plants are concerned, but both xerophytic and calcareous as regards the lichens. On the rounded hill we found various xerophytic seed-plants and lichens, while the conspicuous fringe of blue vervain (*Verbena stricta*) extending half way up its slope on the north and east, the fringe showing a well-marked zonal arrangement and becoming very thin and appearing at a lower level on the south and southwest sides, the direct rays of the sun and the dry southwest winds of summer doubtless making the conditions too dry for this semi-xerophytic species (Fig. 1). The esker, at the point studied, back of the Dorr residence, extends nearly due east and west, and we found trees fringing the north slope, while the

south slope showed no evidence of having ever been tree-covered, here again the direct rays of the sun having doubtless made it impossible for seedling trees to survive (Fig. 2).

Some of the hills have been pastured, and the pasturing has very largely killed out the earth-lichen societies while the rock-inhabiting species have for most part persisted. In portions of the hill-areas not pastured, there is evidence of a struggle for possession of the dry soil constantly going on between the lichens and the seed plants, and statistical studies extended over a long series of years would bring some exact results, provided a considerable and unmolested area could be studied. Along a portion of the summit of the esker, we found an almost pure formation of *Poa compressa*, with an assemblage of seed-plants among which *Poa pratensis* was conspicuous extending down the slope on either side, while the more xerophytic *Poa compressa* had almost complete possession of the limy soil at the summit in this particular spot, having even largely supplanted the lichens which flourished on the calcareous soil a few rods away. Of course the lichens of the pebbles and limy boulders were persisting successfully, even where *Poa compressa* was thickest.

The conditions at Bald Mound and at Johnson's Mound were very much the same, the former, as the name indicates, being bare of trees, while the greater portion of the latter is well wooded (Fig. 3). The lichen societies of all of these hills are similar to those which the present writer has described from various localities in Iowa and Minnesota, viz. *Lecanora calcarea contorta formations* of calcareous pebbles and *Biatora decipiens formations* of calcareous earth. As in the other areas studied in Iowa and Minnesota, the two lichen formations were found occupying the same areas, those of the soil also as usual competing with other plants, mainly spermaphytes. The lichens of the pebbles and boulders show xerophytic adaptation in scantiness of thallus, and often in hypolithic position and endocarpic fruit conditions and certain minute structural conditions which have been considered by the present writer in extended papers on the lichen flora of Minnesota and need not be repeated in this brief discussion. The lichens of the earth are somewhat larger and have in general good cortices, but are still small lichens, single thalli seldom exceeding four or five millimeters in diameter. Their main structural adaptation lies in the small size and the possession of a good protective cortex. At Johnson's Mound, two specimens of a small *Collema* were found, and in all of the regions a thin, flat, blue-green *Nostoc* colony was common, lying loose on the ground, even in the most xerophytic places at hill tops in pastures. This *Nostoc*, a form of *N. commune* Vauch., has never been seen by the present writer in any of the similar habitats studied elsewhere, and seems quite out of harmony with surroundings, *Nostocs* usually growing in moist places, while a form having a thin, flat colony would be the last one to look for in a dry place. A physiological adaptation of several, or possibly all, of the lichens recorded below is their power of building up fats or oils from the lime of the rocks and the soil.

For the sake of the record of distribution of such lichen societies, it will be worth while to record here the lichens found in the two kinds of societies as follows, the plants occurring in the societies on Bald Mound, on Johnson's Mound, on the esker and on the rounded hills near by, unless otherwise indicated in the list of species below.

LECANORA CALCAREA CONTORTA FORMATIONS.

Verrucaria nigrescens.
Verrucaria muralis.
Verrucaria fuscella.
Placodium vitellinum aurellum, and other species.
Lecanora calcarea contorta.
Biatorella (Lecanora) pruinosa, on Bald Mound only.
Dermatocarpon (Endocarpon) pusillum.
Rinodina bischoffii, not found at Bald Mound.

PSORA DECIPIENS LICHEN FORMATIONS OF EXPOSED CALCAREOUS EARTH.

Endocarpon hepaticum.
Psora (Biatora) decipiens.
Heppia despreauxii, not found at Bald Mound.
Bacidia (Biatora) muscorum, Johnson's Mound and round hill only.

A summary of previous studies of similar lichen formations elsewhere may be found in Minn. Bot. Stud. 2:668-670, My 1901. Comparison of the above lists of species with the data recorded in the above citation shows that the societies studied in Illinois are rather poorer in point of species than the similar ones in Iowa and Minnesota. This is doubtless due in part to the fact that nearly all of the area studied in Illinois had been pastured more or less and also no doubt partly to the fact that the conditions in Illinois are on the whole less xerophytic than those of Iowa and Minnesota. Both of these factors would affect the earth lichens more than those of the rocks, the seed plants occupying the soil more completely in the less xerophytic region so that the lichen societies of the earth are reduced more than those of the rocks, while the pasturing acts in the same way.

The distribution of trees and of *Poa compressa* at the esker has been noticed, and the distribution of trees along both sides of the xerophytic crown of the Johnson's Mound is well shown in Fig. 3, the woods bordering the narrow xerophytic formations on both sides. The full list of xerophytic spermaphytes found on the four hills, and nearly all of them on the esker, is as follows:

Poa compressa.
Verbena angustifolia.
Verbena stricta.
Sysyrinchium sp.
Andropogon scoparius.
Echinospermum lappula.
Lithospermum angustifolium.
Scutellaria parvula.
Arenaria plantaginifolia.
Viola pedata.
Erigeron strigosus.
Petalostemon sp.
Solidago nemoralis.
Arenaria michauxii.

The writer has not previously recorded the spermaphytic xerophytes found growing with these lichen societies of the calcareous earth and rocks, and it is through the aid of Dr. Cowles that he is able to do so in this instance. The whole area of the till of the region, as well as the more limited esker would form a most inviting field for extended ecologic study, if indeed natural conditions are not already so much interfered with as to make a complete and exhaustive study impossible.

In closing the writer wishes to express his thanks to Miss Julia Fink for aid in the study, especially in securing the photographs and to Miss Maude Norris for drawing the map, which accompanies this paper.